Bayesian Networks to Quantify Transition Rates in Degradation Modeling: Application to a Set of Steel Bridges in The Netherlands

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Résumé en anglais	Bridge lifetime pose an important challenge in terms of maintenance for decision makers or asset managers. In this regard Markov chains have been used successfully in practice as models for bridge deterioration. However, one limitation of Markov chains can be the assessment of the transition probabilities. In this paper, we propose an approach based on Bayesian networks (BNs) to quantify the transition probabilities of the system state. One of the advantages of doing so is that the BN may be quantified through physical variables linked to the underlying degradation process in an intuitive way through expert judgment combined with field measurements. In addition, the possibility of using Bayesian inference allows updating the probabilities when observations become available that could provide different relevant views of the long-term degradation. An application to a hypothetical stock of steel bridges in the Netherlands is presented and illustrates the method.
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